Innovative Solutions for the Care of Textured Hair

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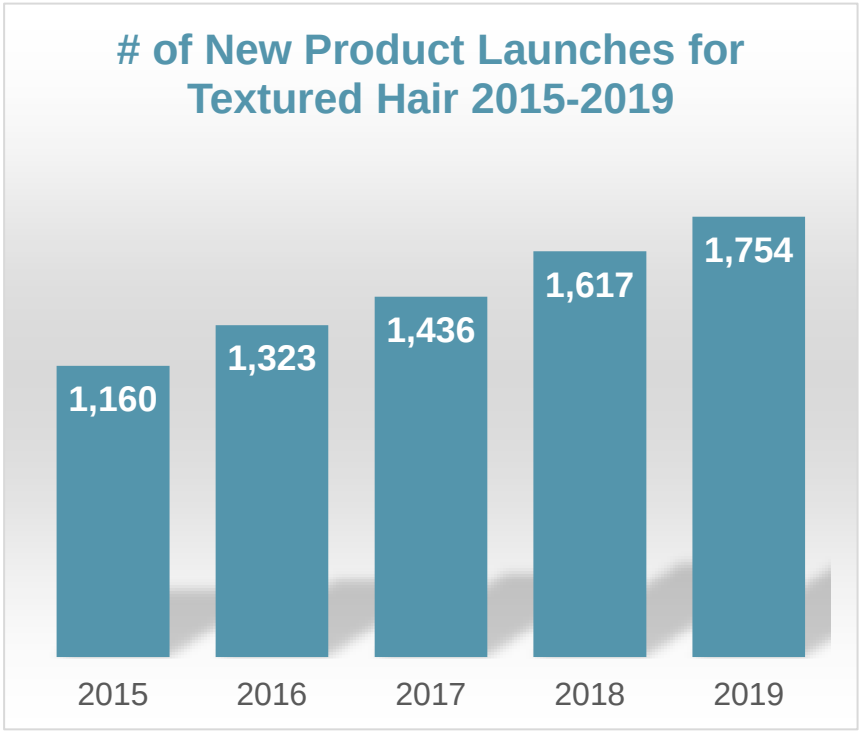
Research & Technology Manager - Personal Care

Textured Hair: A Definition

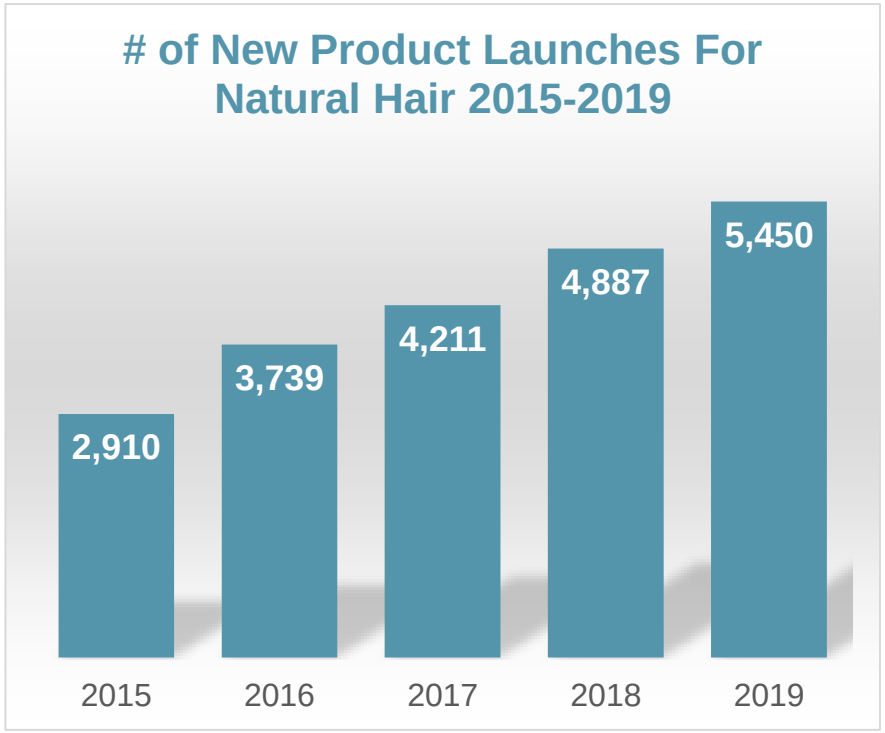
- Any hair with a wave or curl pattern, where the hair strands create shape, such as curves, spirals, zig zags
- Transcends race or ethnicity

Source: NaturallyCurly Texture Trends 2018 Report

Product Launches for Textured Hair On The Rise



51.2% change in the last 5 years

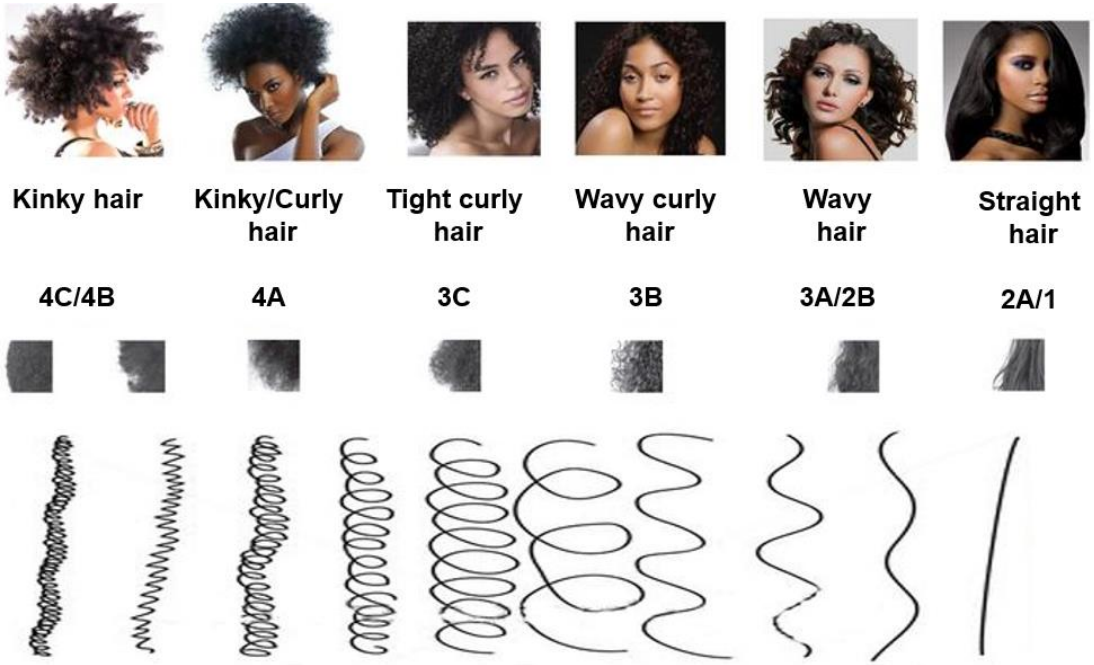


87.3% change in the last 5 years

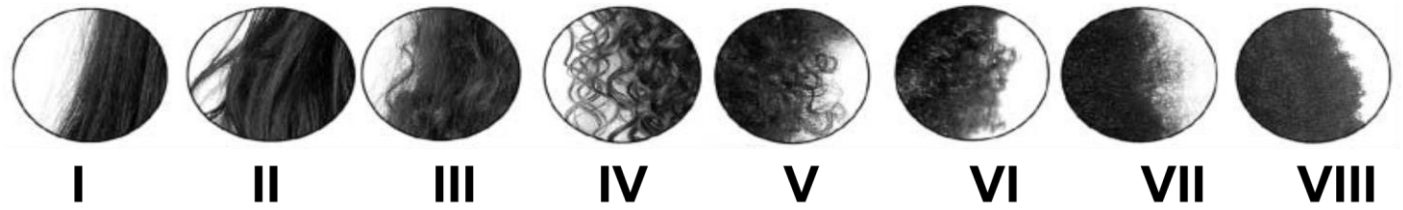
Source: Mintel

Andre Walker Curl Type Classification

- **Traditional visual method** - ranges from **categories 1-4, with sub-categories A-C**
- In some cases there tends to be **overlap** between categories, and it is **open to interpretation**



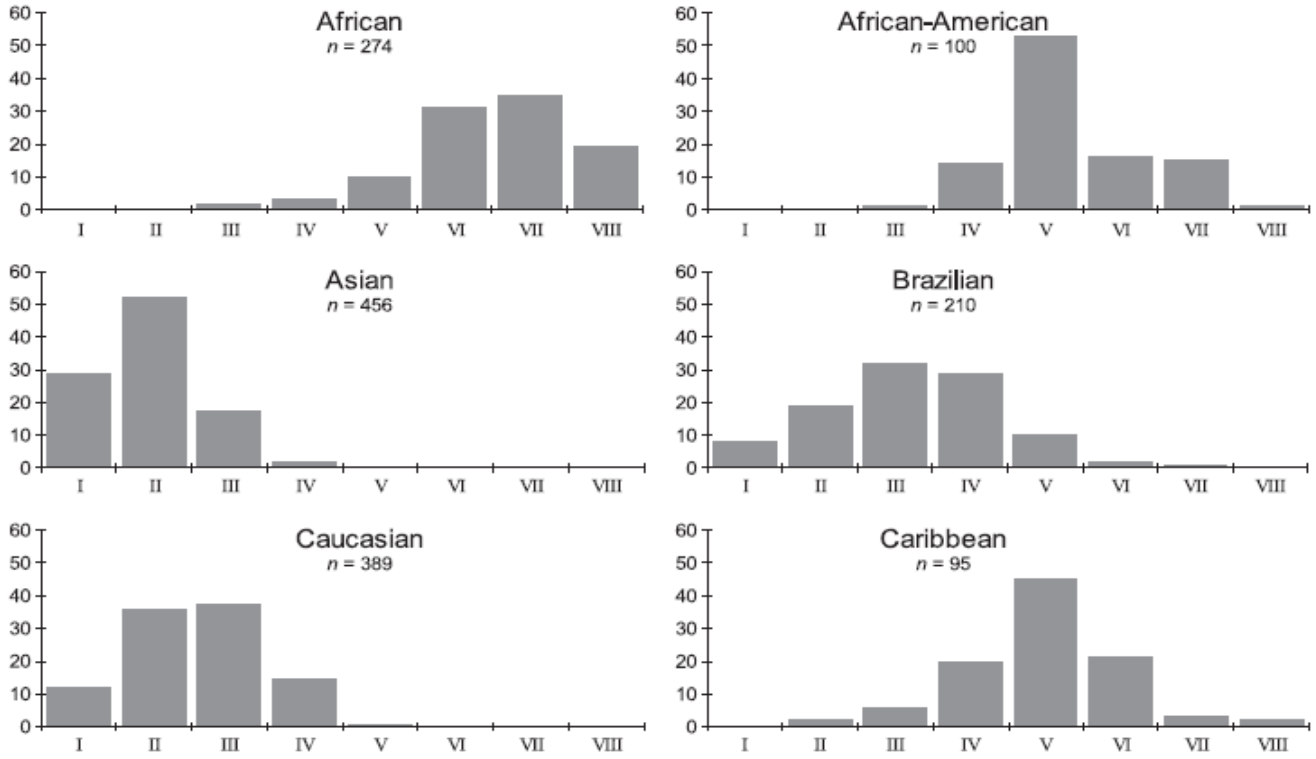
Worldwide Diversity of Hair Shape: Understanding Textures



A scientific approach by L'Oreal looking at four hair characteristics: curve diameter, curl index, number of twists/kinks & number of waves

Source:
Shape Variability and Classification of Human Hair:
A Worldwide Approach
Roland de la Mettrie, Didier Saint-Leger, Genevieve Loussouarn, Annelise Garcel, Crystal Porter, and Andre langaney

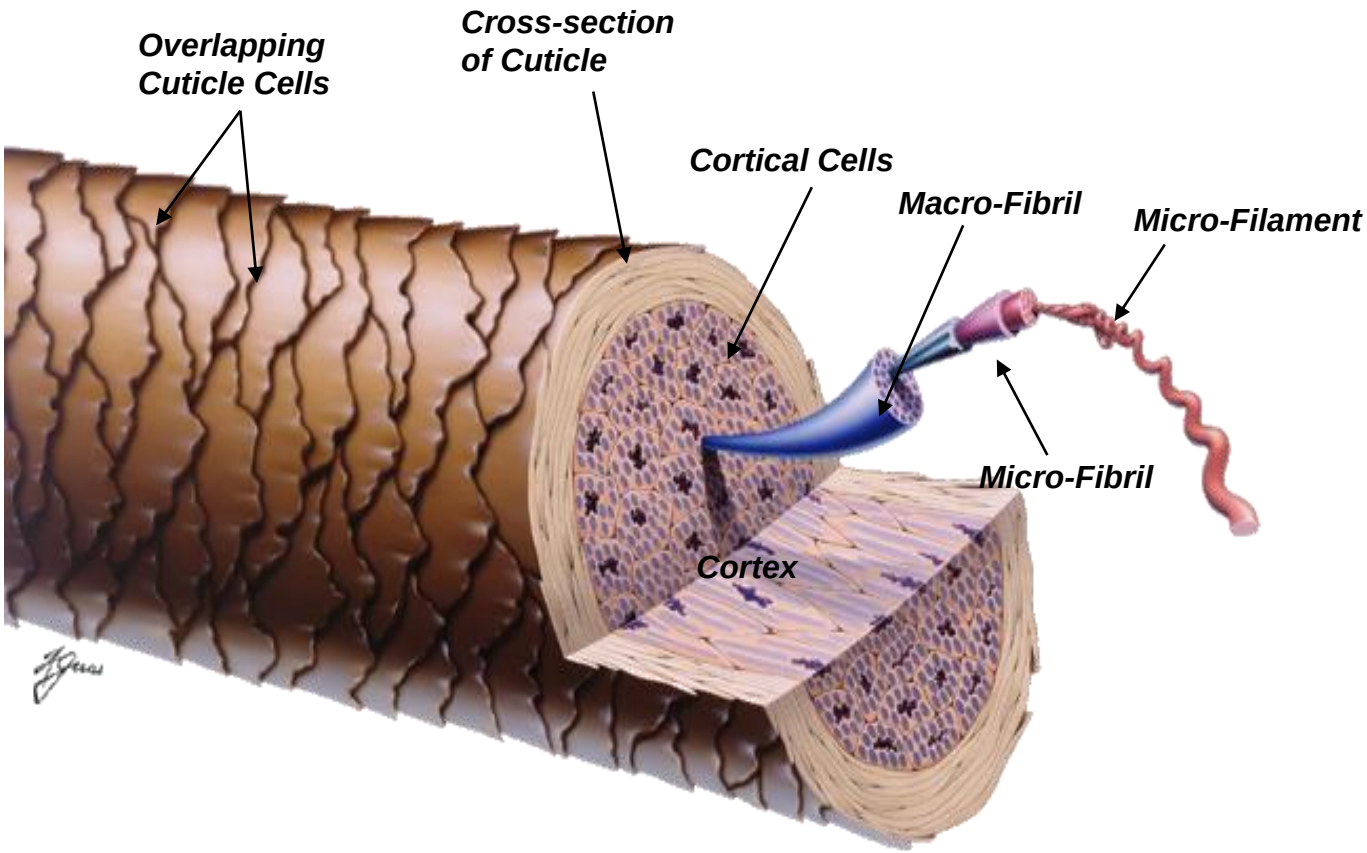
Worldwide Diversity of Hair Curliness



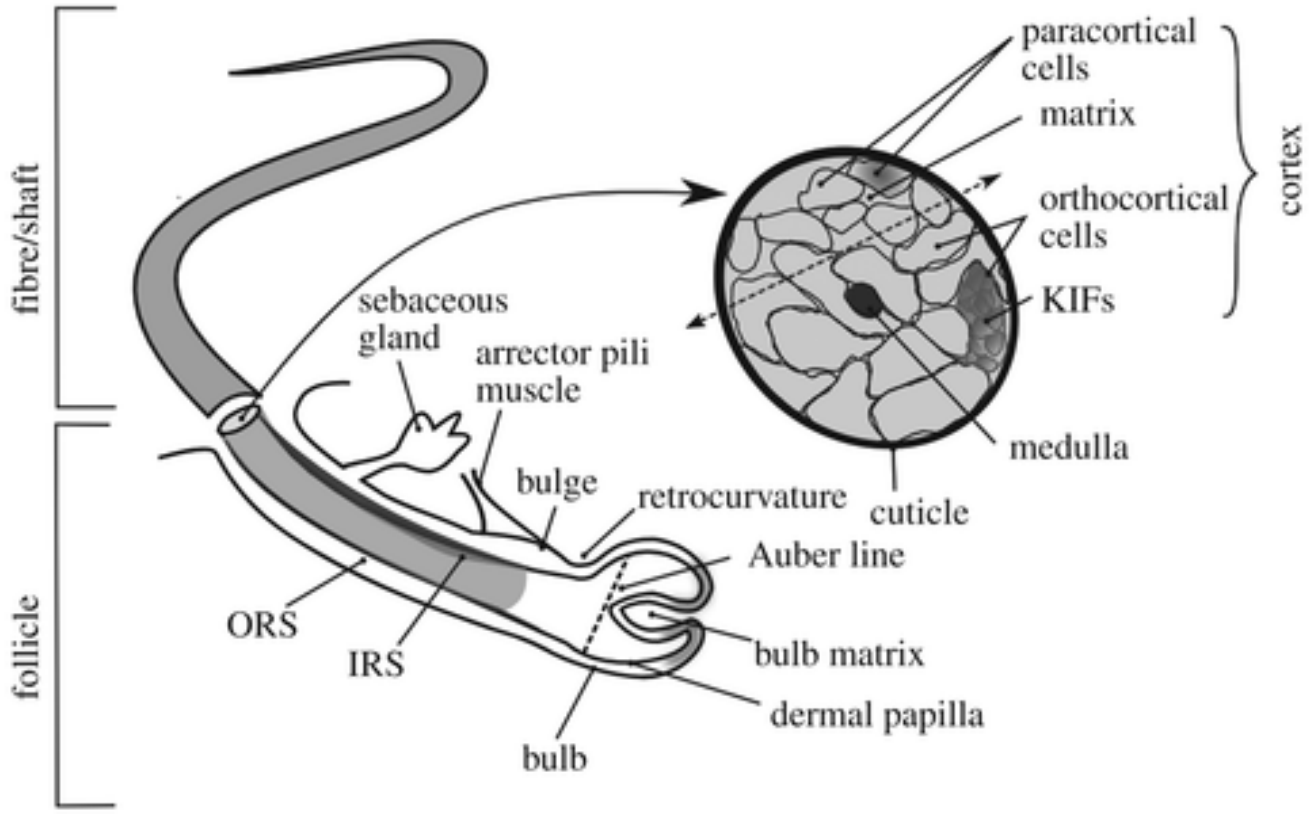
Using this classification, the hair types across different global regions has been mapped

Showing the differences between African & African-American hair types

Hair Morphology



Structure of Afro Textured Hair



Source: Cloete, E., Khumalo, N. and Ngoepe, M. (2019). The what, why and how of curly hair: a review. *Proceedings of the Royal Society A: Mathematical, Physical and Engineering Sciences*, 475(2231), p.20190516.

Chemical Composition of Hair

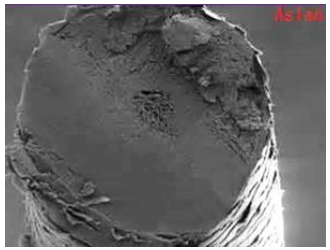
- Proteins (keratin) ~ 65-95%
- Lipids
- Water, varies with RH %
- Trace elements
- Melanin

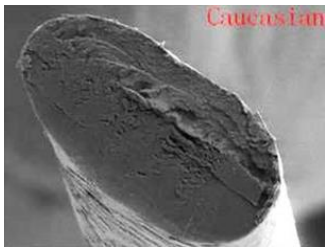
- Composition varies through fiber & between different hair types

- Afro-textured hair has been found to have less lipid and moisture content than straighter hair types

Characteristics of Different Hair Types

Hair type	Asian	Caucasian	African
Oiliness	Oily	Dry to oily	Dry
Cuticle size distribution (µm)	36 – 125 (92 avg.)	46 – 120 (90 avg.)	29 – 96 (70 avg.)
Cuticle layers	8 - 10	7 - 8	7
Ellipticity	1.1 – 1.3	1.2 – 1.5	1.68 – 1.98
Shape of hair	Round	Oval	Flat
Growth rate	0.42mm per day	0.36mm per day	0.29mm per day
Natural style	Straight to wavy	Straight to wavy	Wavy to very curly





The behavior of hair from different countries CRYSTAL E. PORTER, FELICIA DIXON, CHO-CHO KHINE, BRADFORD PISTORIO, HAROLD BRYANT, and ROLAND de la METTRIE, *L'Oréal USA— L'Oréal Institute for Ethnic Hair and Skin Research, Chicago, IL (C.E.P., F.D., C.-C.K., B.P., H.B.), and L'Oréal Recherche, Rio de Janiero, Brazil (R.d.l.M.).*

Characteristics of Afro Textured Hair

- Tight curls, lead to knots (10-16% simple knots on the average head)
- Due to tightness of curls, hair loss due to combing occurs earlier than in straight hair (before telogen takes place) which makes it difficult to grow long
- It is much easier to comb when wet than when dry
- Unequal thickness of hair cuticle and uneven keratin packing in the cortex could create weak-points within fibres
- Smallest diameter out of all hair types
- Lower tensile properties, such as elasticity, breaking point and % elongation due to the consistent trauma of grooming

Characteristics of Afro Textured Hair

Image source: Human hair shape is programmed from the bulb. Thibaut S1, Gaillard O, Bouhanna P, Cannell DW, Bernard BA

- Lower moisture content and uptake in comparison to other hair types
- Significantly less terminal hair follicles compared to Caucasian hair, making it less dense
- Populations with Afro-textured hair are more prone to scalp conditions such as scaliness, irritation and dryness due to more trans-epidermal water loss (TEWL)
- The shape and morphology of the follicle play a big role in the appearance of hair

Understanding the Needs

Innovative Solutions for the Care of Textured Hair

CRODA

Smart Science to Improve Lives™

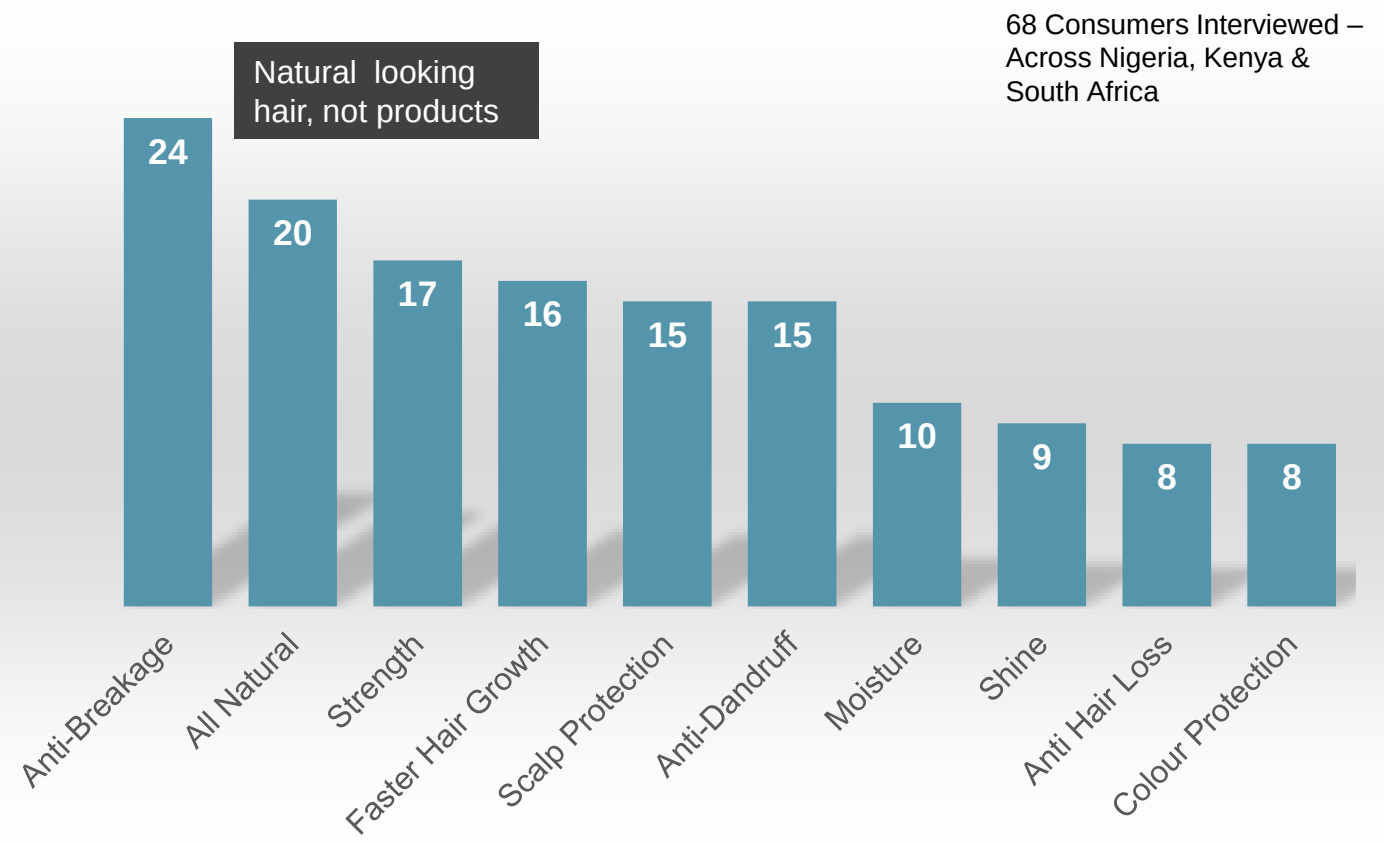
Consumer Focus Groups

Identifying the consumer needs

Understanding consumer needs

Understanding consumer products

Top 10 Natural Textured Hair Needs Across Africa



Meeting The Needs with Innovative Croda Technologies

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Smart Science to Improve Lives™

The Need: Anti-Breakage/Hair Strength

To prevent hair **breakage** and minimise split ends…

…choose **Keravis™**

The Solution: Keravis™

INCI – *Aqua (and) Hydrolyzed Vegetable Protein PG-Propyl Silanetriol*

Benefits

- Increases the strength of damaged hair inside and out
  - Proven to strengthen virgin Afro Textured hair
- Reduces hair breakage
- Protects from styling and grooming practices
- Prevents split ends

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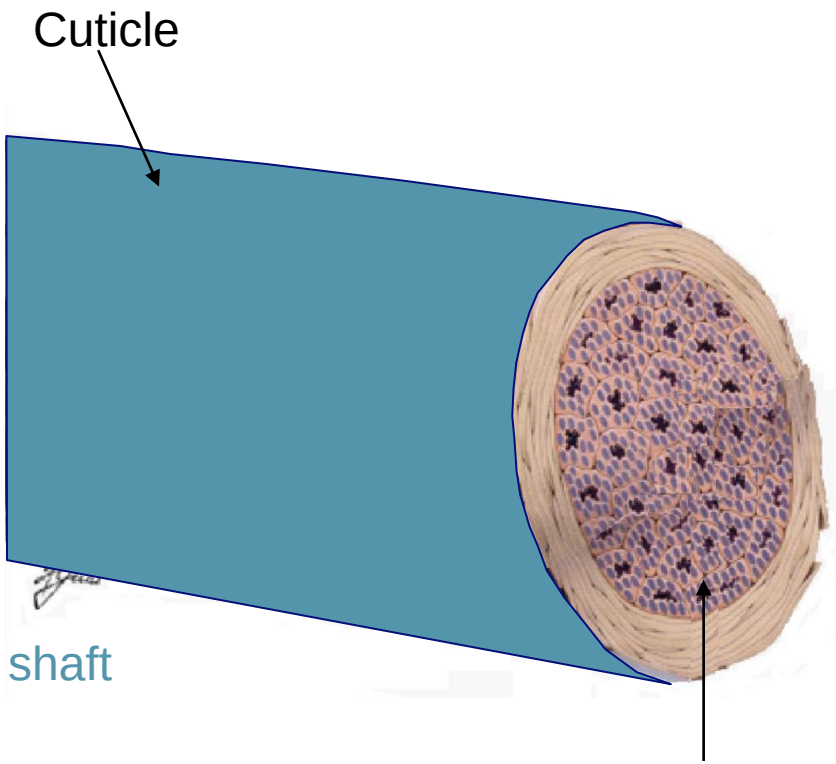
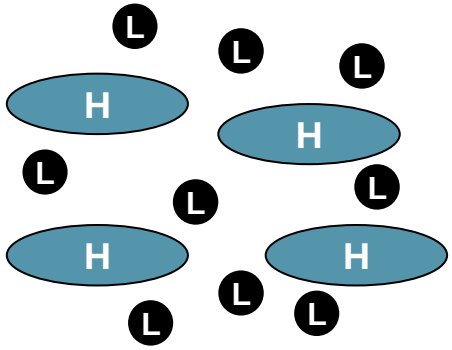
How Does Keravis™ PE Strengthen Hair?





Higher molecular weight components

↓

Form a film on the hair shaft

↓

Lubricate and reinforce the cuticle

Low molecular weight components

↓

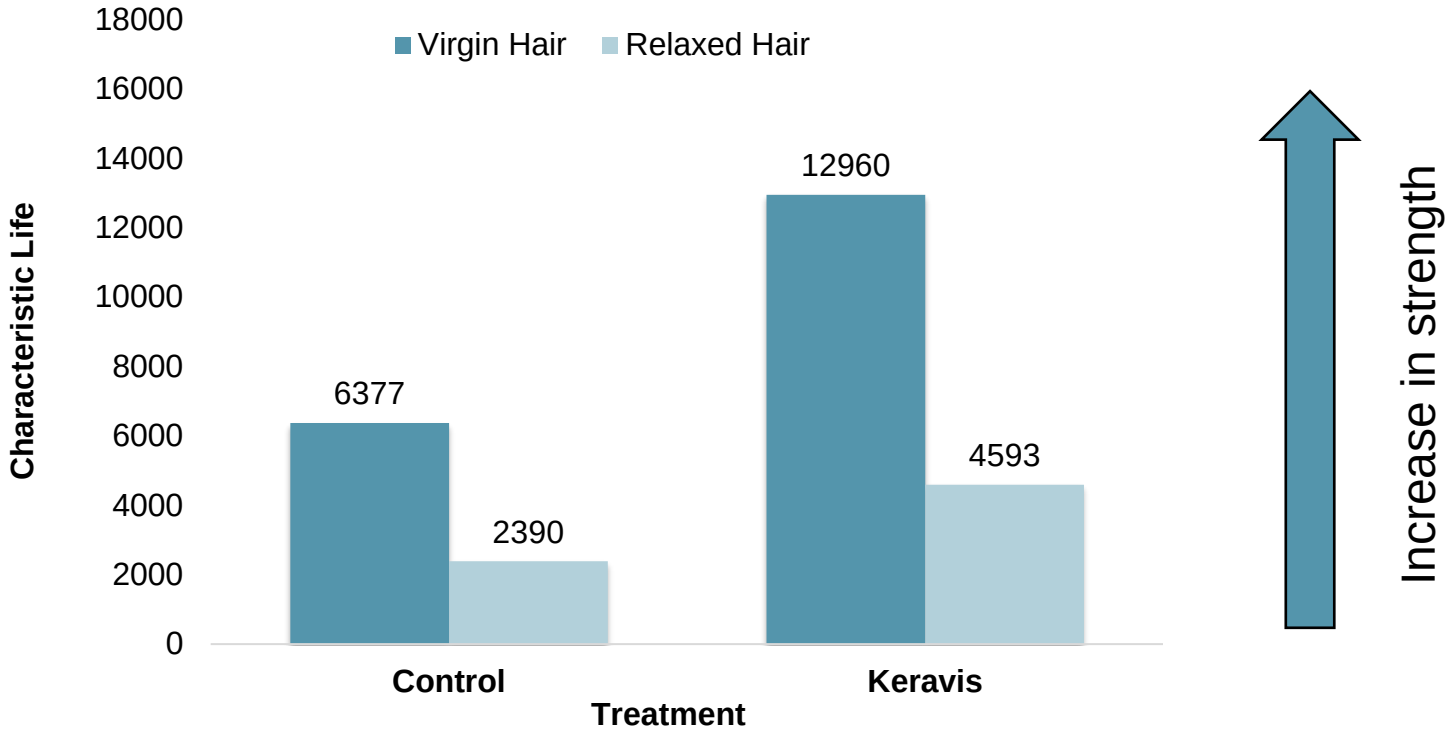
Penetrate the Cortex

↓

Moisturise and Plasticize the hair

Measure of Hair Strength via Cyclic Fatigue Testing

Characteristic life represents the time it takes for 63.2% of hair fibers to fail



- Hair fibres are more resilient and withstanding a higher number of cycles

The Need: Hair Strength

To improve the overall **strength** and **quality** of Textured hair with a **vegan-suitable alternative** to animal-derived **keratin** protein

…choose **KeraMatch™ V**

The Solution: KeraMatch™ V

INCI – *Aqua (and) Hydrolyzed Pea Protein (and) Hydrolyzed Potato Protein*

Benefits

- Vegan suitable
- Optimized plant-derived protein blend offering a viable alternative to animal derived keratin
- Provides strengthening benefits for damaged/fragile hair, as well as improvement in other tensile properties
- Substantive to hair fiber
- Excellent sensory profile

Innovative Solutions for the Care of Textured Hair

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Consumer Perception of Proteins

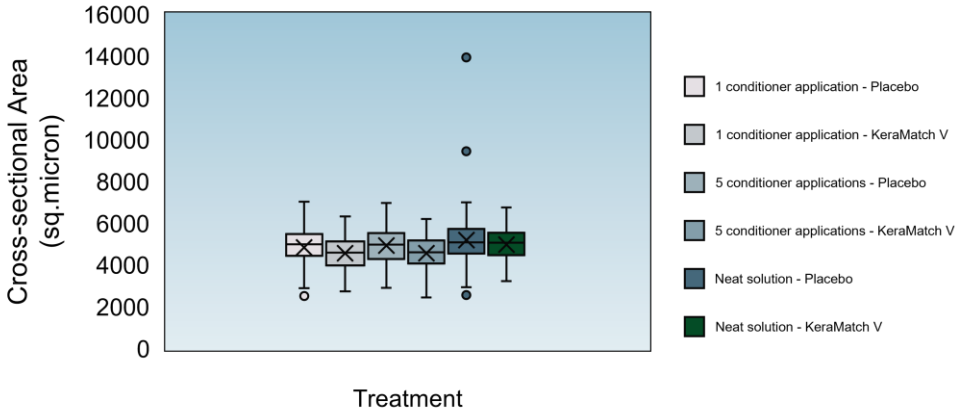
- Treatment masks, deep conditioning treatments containing proteins are very popular to address the need for **healthier**, **stronger** hair

- Consumer perception of protein treatments
  - "Too much protein is bad for your hair"
  - Leaves hair feeling *dry*, *stiff*, *difficult to manage,* and therefore more prone to *break more easily*

- Treatment with **KeraMatch™ V** demonstrated:
  - Significant **strengthening** benefit for type VII Afro-Textured hair
  - No negatively impact hair stiffness
  - **No build-up** effect seen from either repeated conditioner applications nor from application of a neat protein solution

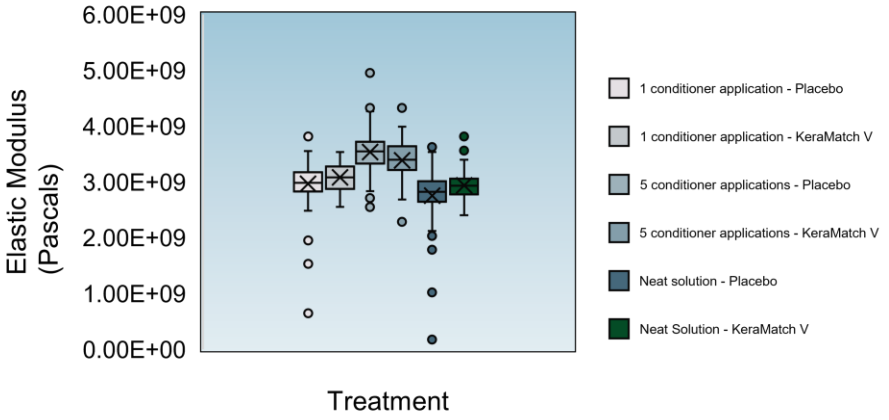
No Build-Up or Stiffness Effect with KeraMatch™ V

Cross-Sectional Area is an indication of the size of the hair fibre. An increase in cross-sectional area indicates build-up of protein on the hair



No increase in **Cross-Sectional Area** of the hair fibre after repeated conditioner applications or with use of the neat protein solution containing **KeraMatch™ V**, indicating **no detrimental impact** on the hair fibre due to protein build up

An increase in **elastic modulus** can result in stiff, brittle hair fibres with poor mechanical properties



After 5 conditioner applications containing **KeraMatch™ V**, the **Elastic Modulus** of the hair fibre is **reduced**, suggesting that hair is **less stiff**.

Treatment with the neat protein solution of **KeraMatch™ V** saw **no significant change** in the **Elastic Modulus**, indicating that the **stiffness** of the hair has **not been impacted**

The Need: Scalp Care

For effective, consumer-perceivable **scalp moisturisation** and hair conditioning benefits…

Intelligent Hydration

…choose
DuraQuench™ IQ SA

The Solution:
DuraQuench™ IQ SA

INCI – *Cetyl Alcohol (and) Isostearyl Isostearate (and) Potassium Cetyl Phosphate (and) Cetyl Stearate (and) Stearic Acid*

Benefits

- Provides consumer-perceivable, effective scalp moisturization at a 1% usage level
  - Creates an intelligent structural bilayer on the surface of the skin to regulate water loss
  - Interacts with the lipid bilayers within the stratum corneum to reinforce the skin's natural skin barrier

- Delivers additional consumer-perceivable hair conditioning benefits

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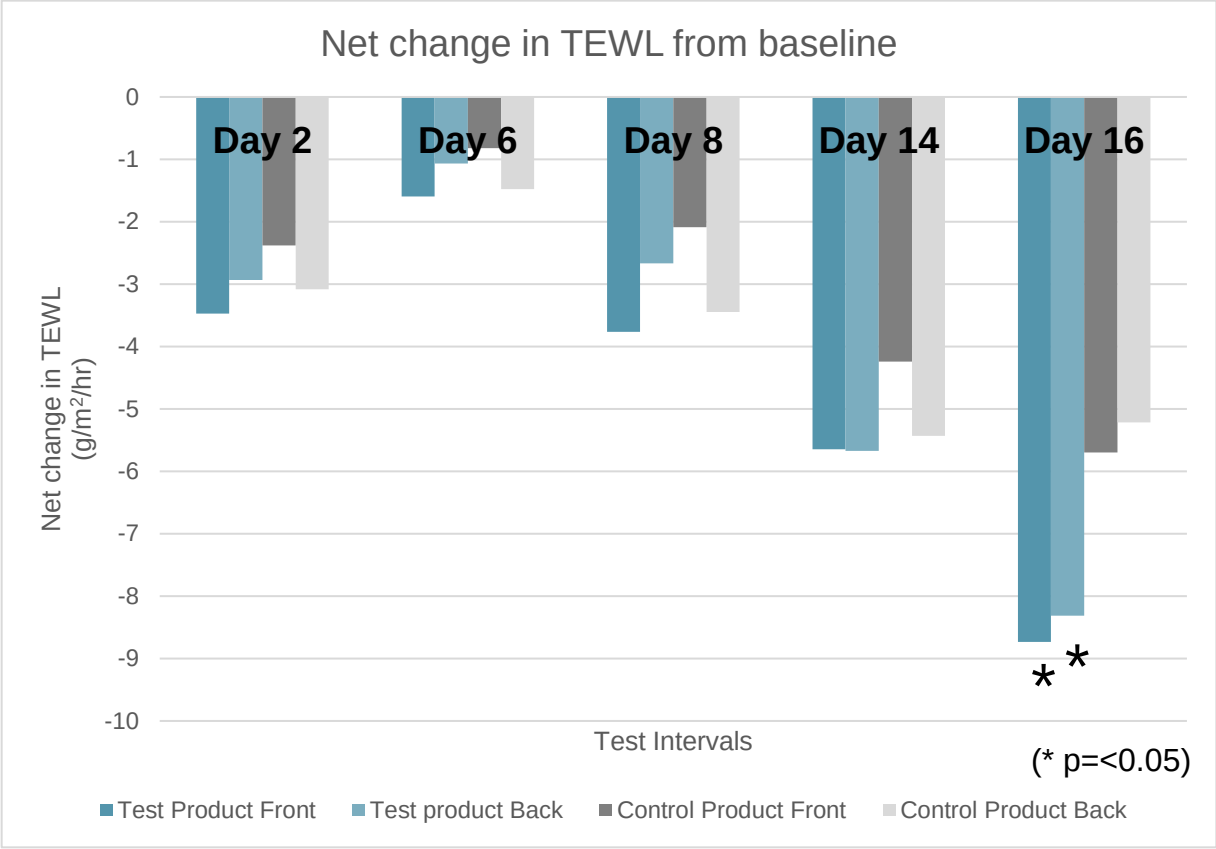
Trans-Epidermal Water Loss (TEWL)

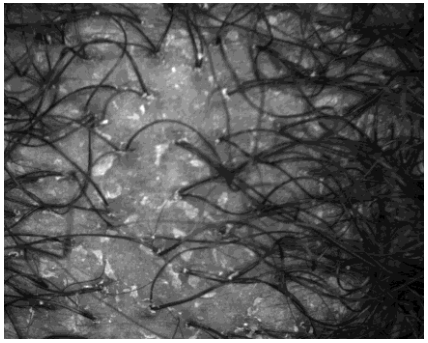


* Statistically significant improvement of the front and back scalp barrier function after 16 days compared to control

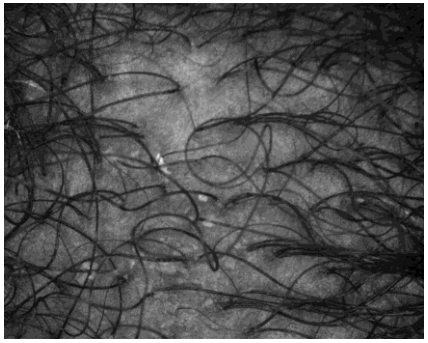
BACKTEST

DAY 0

Panellist 26

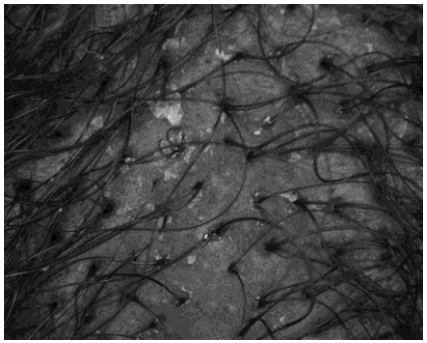


DAY 16

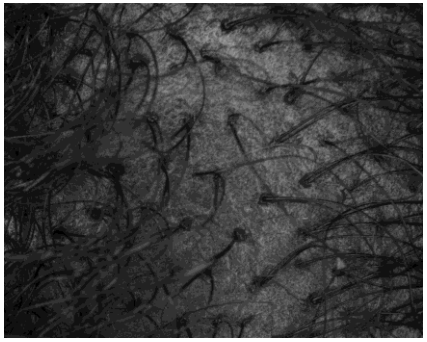


DAY 0

Panellist 28



DAY 16

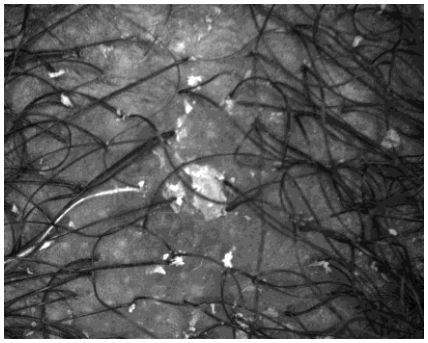


Proudly tested in Africa

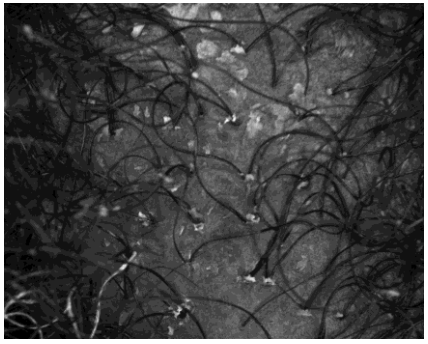
BACK CONTROL

DAY 0

Panellist 30

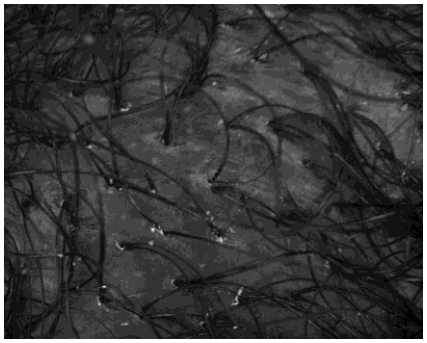


DAY 16

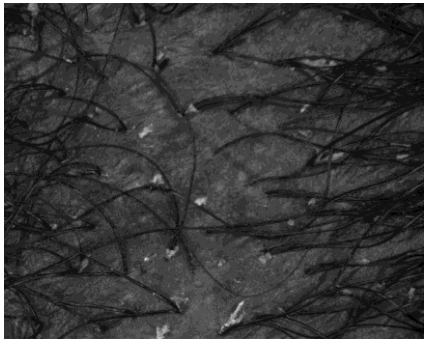


DAY 0

Panellist 13



DAY 16



The Need: Moisturisation/ Hair Softness

To impart **softness** and give the consumer-perceived feeling of moisturized hair…

…choose **Crodazosoft™ DBQ**

Softness Cues Moisturisation

Pantene.com

Dove.com

- The Dry Defy collection instantly revives dull, dehydrated hair with rich **moisture** for beautiful, silky **soft** hair.
- Pantene Dry Defy Expert Collection Intense **Hydration** Conditioner helps restore your hair's shine and **softness** with powerful, lightweight conditioning agents designed to seal in hydration without weighing hair down.

- **Want instantly soft and visibly smooth hair?** Dry hair can be hard to manage and style.
- **About Dove Daily Moisture Range** Dove Daily Moisture with Pro-Moisture Complex gently cleans while nourishing, without weighing hair down. With every use, hair gets **soft**, smooth and beautiful.

Softness is a cue to consumers that hair has been moisturised

The Solution:
Crodazosoft™ DBQ

INCI - *Quaternium-91 (and) Cetrimonium Methosulfate (and) Cetearyl Alcohol*

Benefits

- Delivers excellent softness, conditioning and improved combability
- Promotes delivery of lipophilic actives
- Prevents cuticle abrasion damage
- Provides colorwashfastness benefits for colored hair

Innovative Solutions for the Care of Textured Hair

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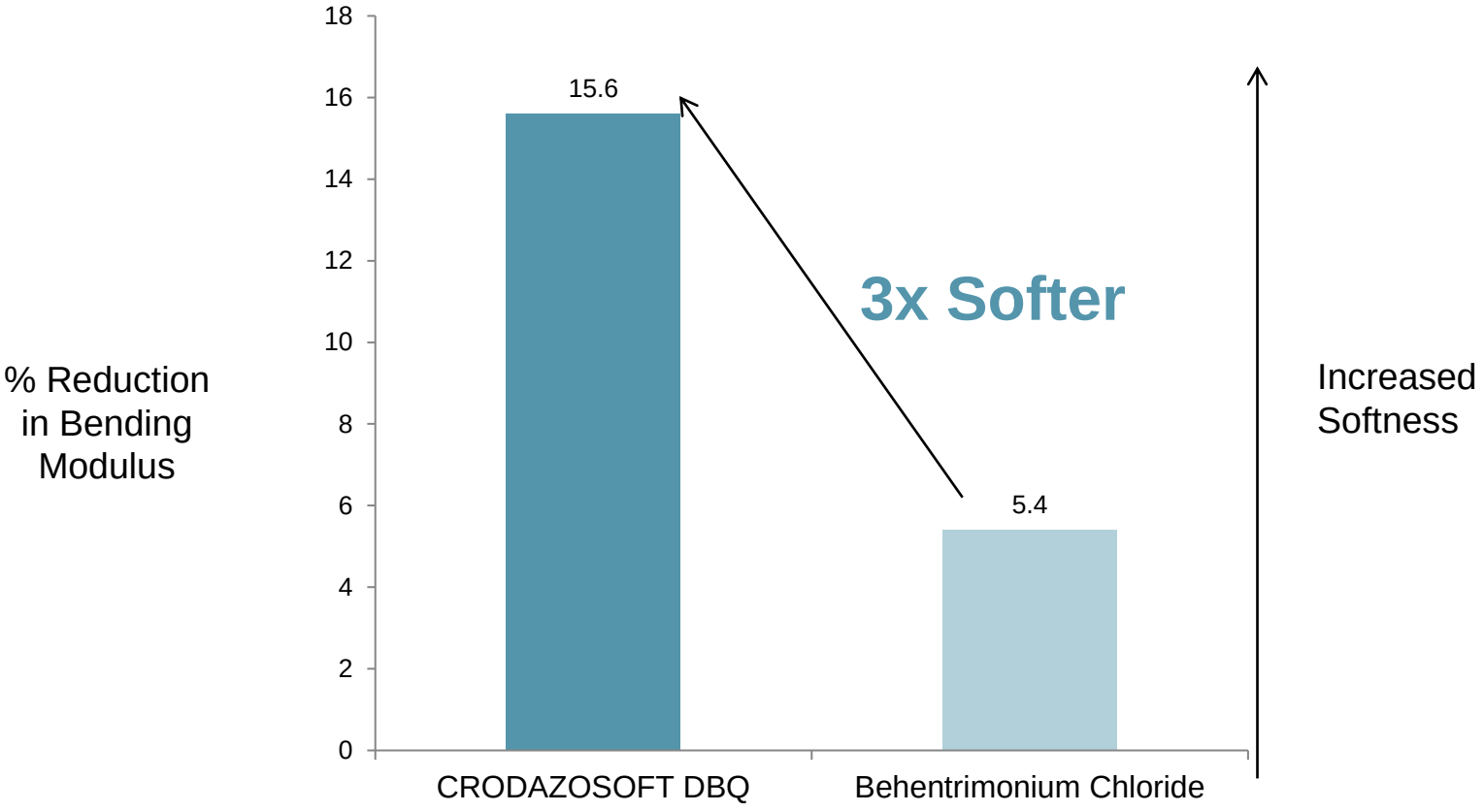
Softer Hair With Crodazosoft™ DBQ

Virgin Hair



The Need: Manageability

For enhanced **manageability**, intensive/**deep conditioning** treatment for multicultural and damaged hair …

…choose
Crodazoquat™ MCC

Crodazoquat™ MCC

INCI - *Behentrimonium Methosulfate (and) Quaternium-87 (and) Cetearyl Alcohol*

Innovative Solutions for the Care of Textured Hair

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Benefits

- Multicultural conditioner suitable for use on various hair types and ethnicities
  - Performed especially well on damaged hair
- Delivers perceivable sensory to the hair
  - Proven sensorial benefits on Textured Afro hair
- Restores natural hydrophobicity of the hair
- Above 80% natural, VOC-free, Glycol-free

Replenishing Deep Conditioner for African Hair HP-409

Ingredients	% w/w
Part A	
Water Deionised (Aqua)	87.50
Arlasilk™ PLN (Linoleamidopropyl PG-Dimonium Chloride Phosphate Dimethicone (and) Aqua)	1.00
Part B	
Crodazoquat™ MCC (Behentrimonium Methosulfate (and) Quaternium-87 (and) Cetearyl Alcohol)	2.00
Crodacol™ S95 (Stearyl Alcohol)	6.00
Duraquench™ IQ SA (Cetyl Alcohol (and) Isostearyl Isostearate (and) Potassium Cetyl Phosphate (and) Cetyl Stearate (and) Stearic Acid)	1.00
Cropure™ Almond (Prunus Amygdalus Dulcis (Sweet Almond) Oil)	0.50
Cropure® Apricol Kernel (Prunus Armeniaca (Apricot) Kernel Oil)	0.50
Part C	
Keravis™ PE (Hydrolyzed Vegetable Protein PG-Propyl Silanetriol (and) Water (Aqua))	1.00
Water (and) Sodium (and) Benzoate (and) Potassium Sorbate	0.50

Replenishing Deep Conditioner for African Hair

HP-409

"My hair has more volume and it is smooth from root to tip"
Gugu – relaxed African hair

"My hair is flexible, it moves, it's not heavy, I feel life in my hair now, I love it"
Bulelwa – relaxed African hair

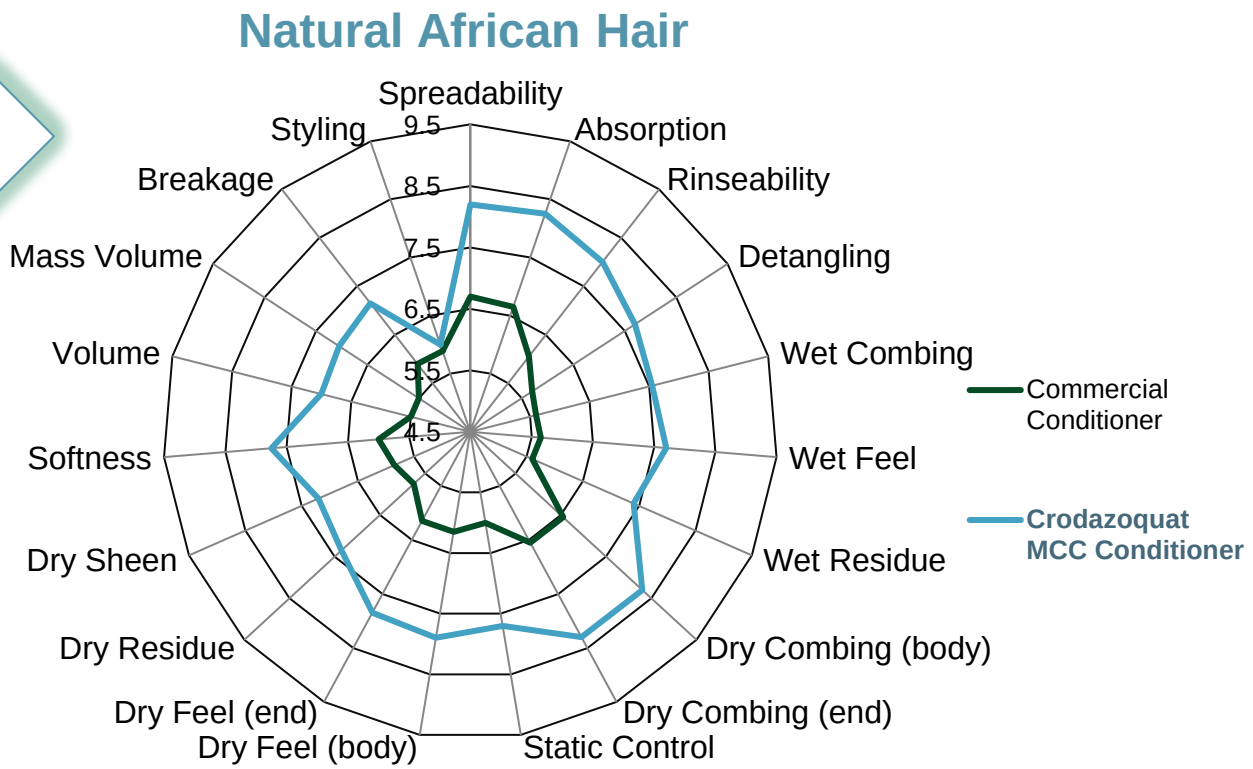
yl PG-Dimonium Chloride Phosp	
ntrimonium Methosulfate (and) Quaternium-	
Stearyl Alcohol)	6.0
ohol (and) Isostearyl Isostearate (and) Pot (and) Stearic Acid)	1.0
mygdalus Dulcis (Sweet A	
rmeniaca (Apricot) Kerne	
able Protein PG-Propyl Silan	
enzoate (and) Potassium Sorbate	0.50

"My hair is softer and less painful when combing"
Pamela – natural African hair

"My hair is softer and easy to comb"
Lungile – natural African hair

African Hair Salon Results vs Commercial Conditioner

Anti-breakage, ease of styling and density are important African hair needs



Crodazoquat MCC conditioner significantly outperformed the commercial conditioner on Breakage, Mass Volume, and Styling attributes, which address important hair needs for anti-breakage, appropriate density, and ease of styling

The Need: Curl Manageability

For enhanced **curl manageability**, **frizz control**, and superior **style retention**…

…choose **MiruStyle™ MFP PE**

…choose **MiruStyle™ CP**

Mirustyle™ MFP PE

INCI - *Aqua (and) Hydroxypropyltrimonium Hydrolyzed Corn Starch*

Benefits

- Provides superior style retention without detracting from the aesthetic properties of the hair
- Excellent de-frizzing agent
- Significantly reduces static flyaway
- Low tack for superior hand feel and ease of styling
- Minimal flaking
- Naturally derived and biodegradable

Innovative Solutions for the Care of Textured Hair

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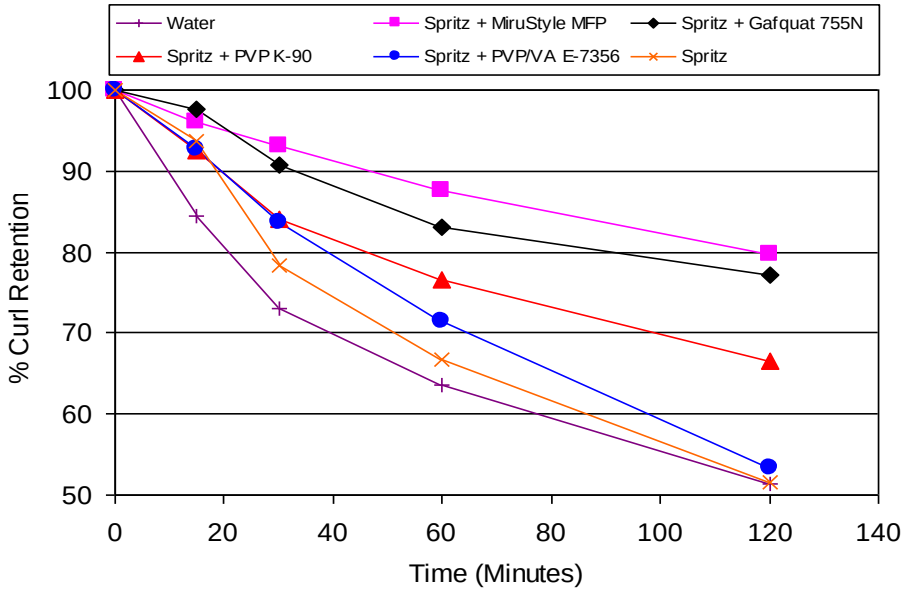
Outstanding Style Retention & Anti-Frizz

MiruStyle™ MFP shows superior **high humidity curl retention** compared to other popular styling agents



Significant **frizz reduction** with hair pre-treated with an aqueous spritz containing **MiruStyle™ MFP** compared to the control spritz

Water

Basic Spritz

MiruStyle™ MFP

MiruStyle™ CP

INCI - *Aqua (and) Polyquaternium-10 (and) PG-Hydroxyethylcellulose Cocodimonium Chloride*

Benefits

- Exceptional curl memory benefits for added **"spring factor"** - high energy curls
- Excellent dynamic curl retention for moveable hold
- Anti-frizz benefits for well defined curls
- Non-crispy for touchable hold. Produces low tack formulas
- Suitable for clear systems

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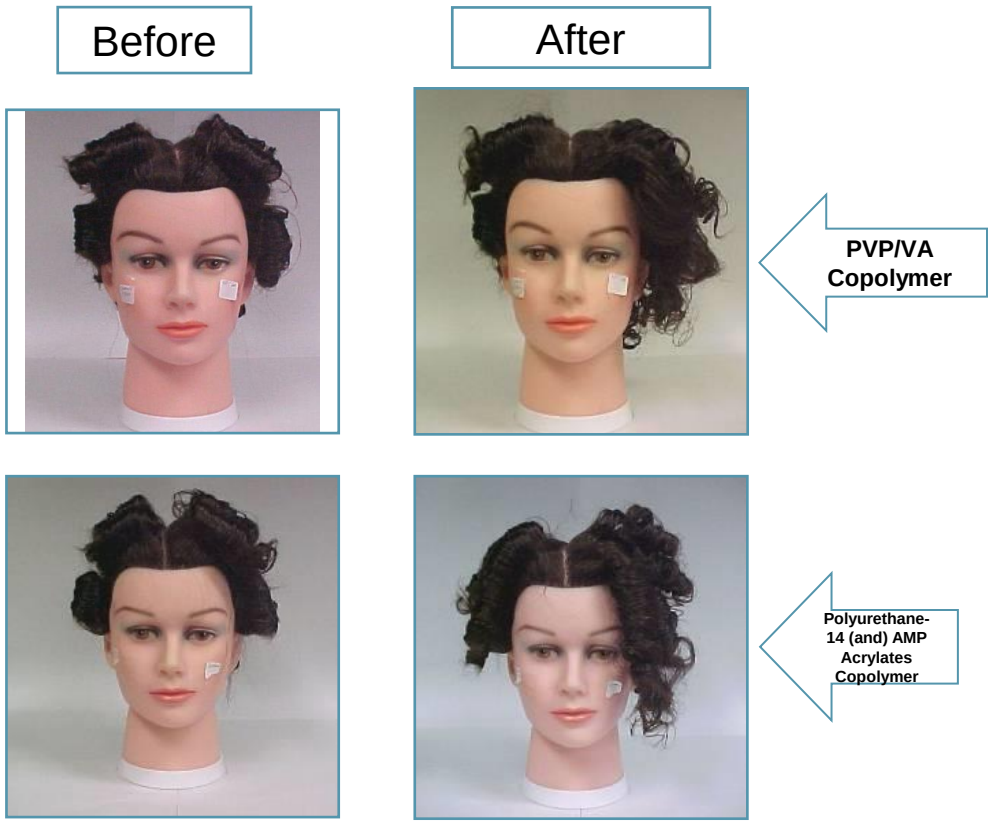
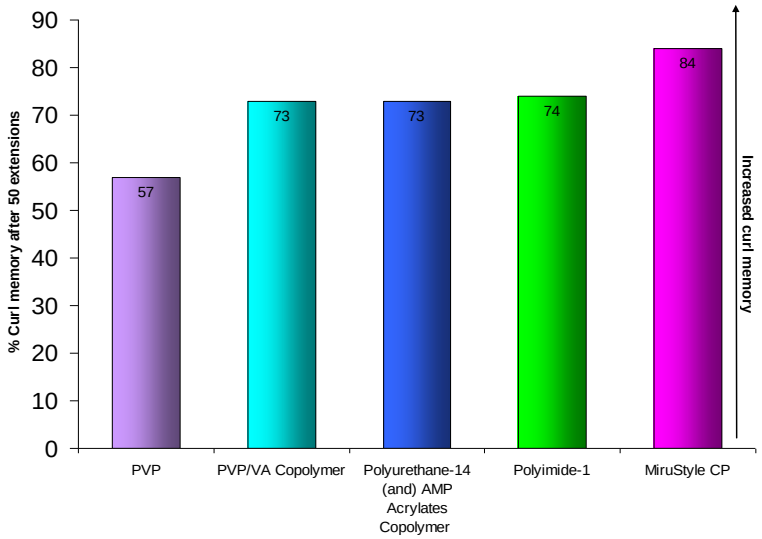
Dynamic Curl Retention & Curl Memory

MiruStyle™ CP shows superior performance compared to other styling polymers



MiruStyle™ CP displays superior **curl memory** benefits compared to other commonly used styling agents



MiruStyle CP retained 84% of the original curl after 50 extensions

Formulations we L💙VE -
for Textured African Hair

Inspirational Formulations

Afro Textured Hair Routines

DAILY

- Part hair into 4 sections **P.M**
- Detangle using fingers
- Twist/braid using 2-3 strands
- Wrap the hair using silk scarf

- Undo twists **A.M**
- Detangle
- Optional - Moisturise & scalp spray
- Style using styling aids

WEEKLY

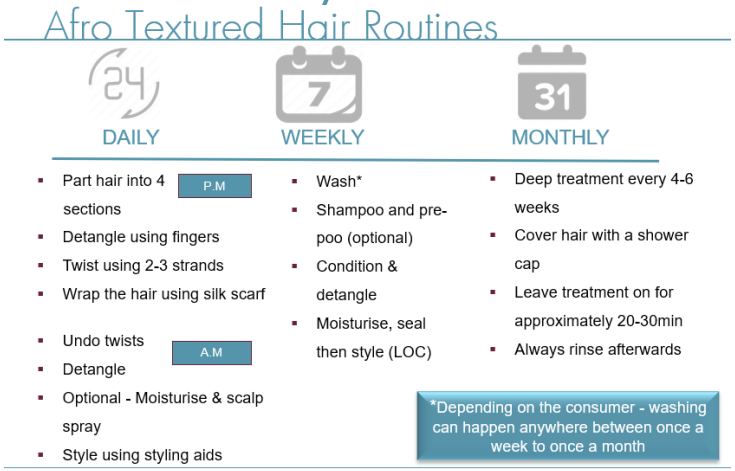
- Wash*
- Shampoo and pre-poo (optional)
- Condition & detangle
- Moisturise, seal then style (LOC)

MONTHLY

- Deep treatment every 4-6 weeks
- Cover hair with a shower cap
- Leave treatment on for approximately 20-30min
- Always rinse afterwards

*Depending on the consumer - washing can happen anywhere between once a week to once a month

Translates to 5 Key Areas:



1. Cleanse
2. Condition & Detangle
3. Scalp
4. Moisturise & Style
5. Treatment

Formulations we L♥VE - for Textured Hair

Cleanse

ZA-0159

Rich & Creamy Sulphate Free Shampoo

Ingredient/INCI Name	Functionality	% w/w
Part A		
Water Deionised (Aqua)	-	To 100
Pricerine™ 9091 (Glycerin)	Humectant	2.00
Crodasinic™ LS30 (Aqua (and) Sodium Lauroyl Sarcosinate)	Mild Surfactant	8.00
Crodateric™ CAB 30 (Aqua (and) Cocamidopropyl Betaine)	Amphoteric Surfactant	10.00
Promidium™ CO (PPG-2 Hydroxyethyl Cocamide)	Non-ionic surfactant	5.00
Crodapearl™ (Glycol Stearate (and) Stearamide AMP)	Pearlising Agent	2.00
Cropure Apricot Kernel™ (Prunus Armeniaca (Apricot) Kernel Oil)	Natural Oil	1.00
Part B		
Versathix™ (PEG-150 Pentaerythrityl Tetrastearate (and) PPG-2 Hydroxyethyl Cocamide (and) Water)	Rheology Modifier	2.50
Sensifoam™ (Water (and) Glycerin (and) Gypsophila Paniculata Root Extract)	Extract	1.00
Euxyl® PE 9010 (Phenoxyethanol (and) Ethylhexylglycerin)	Preservative	1.00

Formulations we L♥VE - for Textured Hair

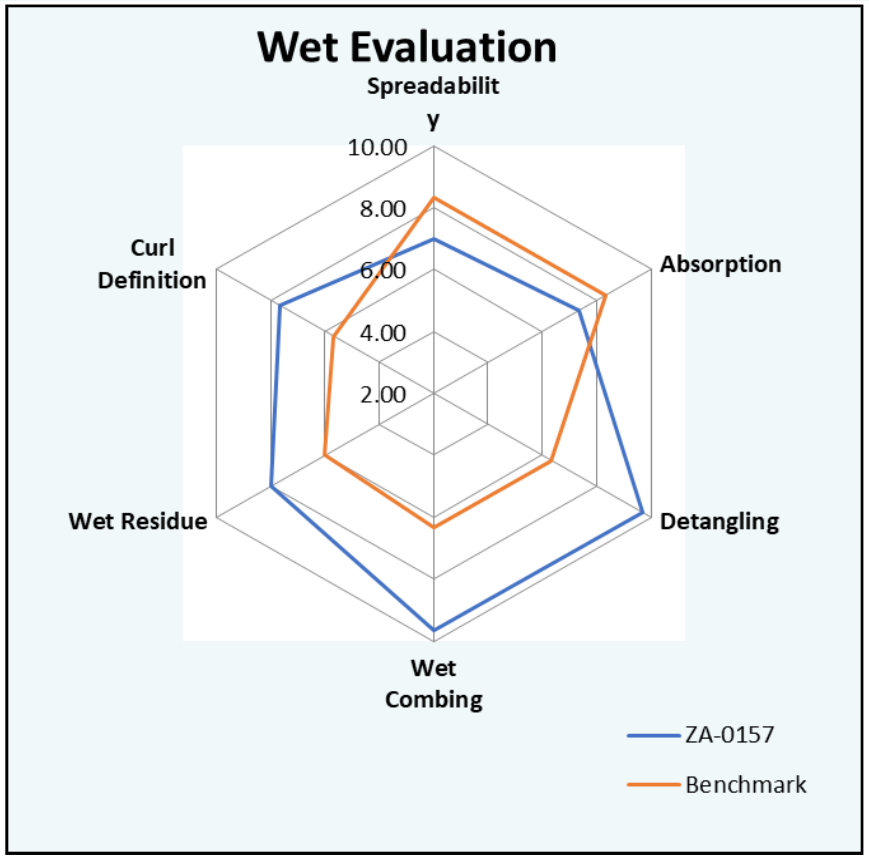
Condition & Detangle

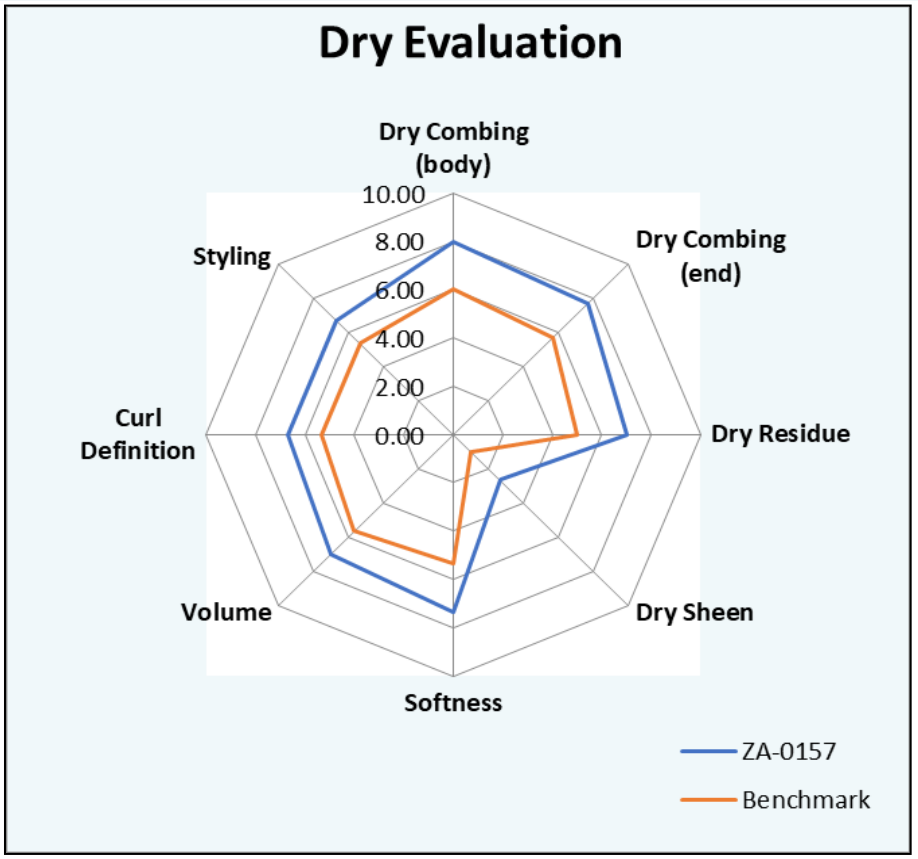
ZA-0157

Hair Milk Refresher

Ingredient/INCI Name	Functionality	% w/w
Part A		
Water Deionised (Aqua)	-	To 100
Part B		
SP Crodazoquat™ MCC (Behentrimonium Methosulfate (and) Quaternium-87 (and) Cetearyl Alcohol)	Conditioner	2.50
Seatons Refined Shea Nut Butter (Butyrospermum Parkii (Shea) Butter)	Natural Butter	3.00
Cropure™ Almond oil (Prunus Amygdalus Dulcis (Sweet Almond) Oil)	Natural Emollient	3.00
Crodamol™ STS (PPG-3 Benzyl Ether Myristate)	Shine Emollient	1.00
Crodasinic™ LS30 (Aqua (and) Sodium Lauroyl Sarcosinate)	Mild Surfactant	1.00
Crodacol™ CS90 (Cetearyl Alcohol)	Viscosity Builder	3.00
Part C		
Phytolea™ Lime (Citrus Aurantifolia (Lime) Seed Oil)	Natural Oil	0.80
Euxyl® PE 9010 (Phenoxyethanol (and) Ethylhexylglycerin)	Preservative	0.80

Salon data showed…





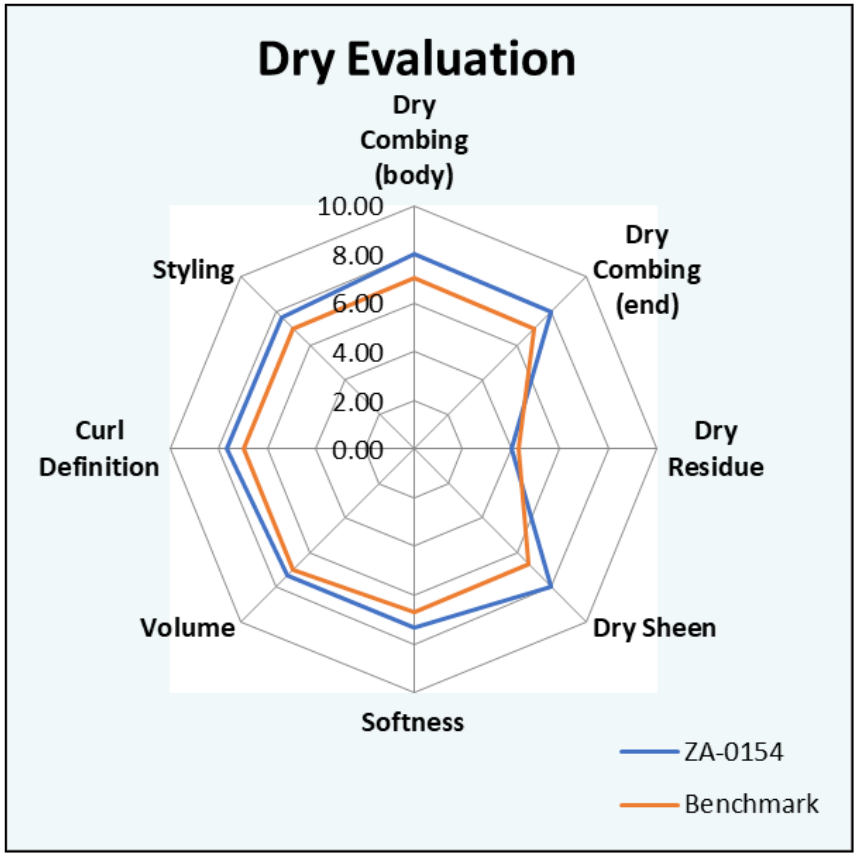
In the wet evaluation ZA-0157 Hair Milk Refresher performed better on curl definition, combing and detangling. It outperformed the benchmark on all dry attributes. Both panellists and stylist preferred the side treated with ZA-0157 and felt that it was more conditioned and softer than the benchmark.

ZA-0154

Hair Mayonnaise

Ingredient/INCI Name	Functionality	% w/w
Part A		
Water Deionised (Aqua)	-	To 100
Pricerine™ 9091 (Glycerin)	Humectant	3.00
Part B		
SP Crodazoquat™ MCC (Behentrimonium Methosulfate (and) Quaternium-87 (and) Cetearyl Alcohol)	Conditioner	2.00
Crodamol™ AB (C12-15 Alkyl Benzoate)	Emollient	5.00
Seatons Olive Oil (Olea Europaea (Olive) Fruit Oil)	Natural Emollient	2.00
Crodamol™ STS (PPG-3 Benzyl Ether Myristate)	Shine Emollient	1.00
Seatons Refined Coconut Oil (Cocos nucifera (Coconut) Oil)	Natural Moisturiser	2.00
Crodacol™ CS50 (Cetearyl Alcohol)	Viscosity Builder	3.00
Part C		
Keravis™ PE (Aqua (and) Hydrolyzed Vegetable Protein PG-Propyl Silanetriol)	Strengthening Active	1.00
Viscaress™ HPD (Polyquaternium-37 (and) Hydrogenated Polydecene (and) Trideceth-6)	Rheology Modifier	1.00
Euxyl® PE 9010 (Phenoxyethanol (and) Ethylhexylglycerin)	Preservative	0.80
Phytolea™ Pomegranate (Punica Granatum Seed Oil)	Natural Oil	0.50

Salon data showed…



ZA-0154 Hair Mayonnaise performed on parity in dry attributes.

In the preference study the stylist and panellists felt that the ZA-0154 Hair Mayonnaise felt **more conditioned**, **moisturised**, **softer and** was preferred **overall**

Formulations we L💙VE - for Textured Hair

Scalp Care

Scalp

Scalp Soothing Spray – ZA-0086

Ingredient/INCI Name	Functionality	% w/w
Part A		
Water Deionised (Aqua)	-	89.00
Part B		
Duraquench™ IQ SA (Cetyl Stearate (And) Isostearyl Isostearate (And) Cetyl Alcohol (And) Potassium Cetyl Phosphate (And) Stearic Acid)	Moisturising Active	1.00
Crodamol™ ISIS (Isostearyl Isostearate)	Emollient	3.00
Crodamol™ W (Stearyl Heptanoate (and) Stearyl Caprylate)	Cooling emollient	2.50
Part C		
HairSpa™ (Glycerin (and) Lactitol (and) Xylitol)	Scalp moisturisation and soothing active	1.50
Viscaress™ HPD (Polyquaternium-37 (and) Hydrogenated Polydecene (and) Trideceth-6 (and) Aqua)	Rheology Modifier	1.00
Part D		
Phytessence™ Purple Ginseng (Glycerin (and) Aqua (and) Alcohol (and) Polygonum Bistorta Root Extract)	Scalp rebalancing active	1.00
Euxyl® PE 9010 (Phenoxyethanol (and) Ethylhexylglycerin)	Preservative	1.00

Formulations we L💙VE - for Textured Hair

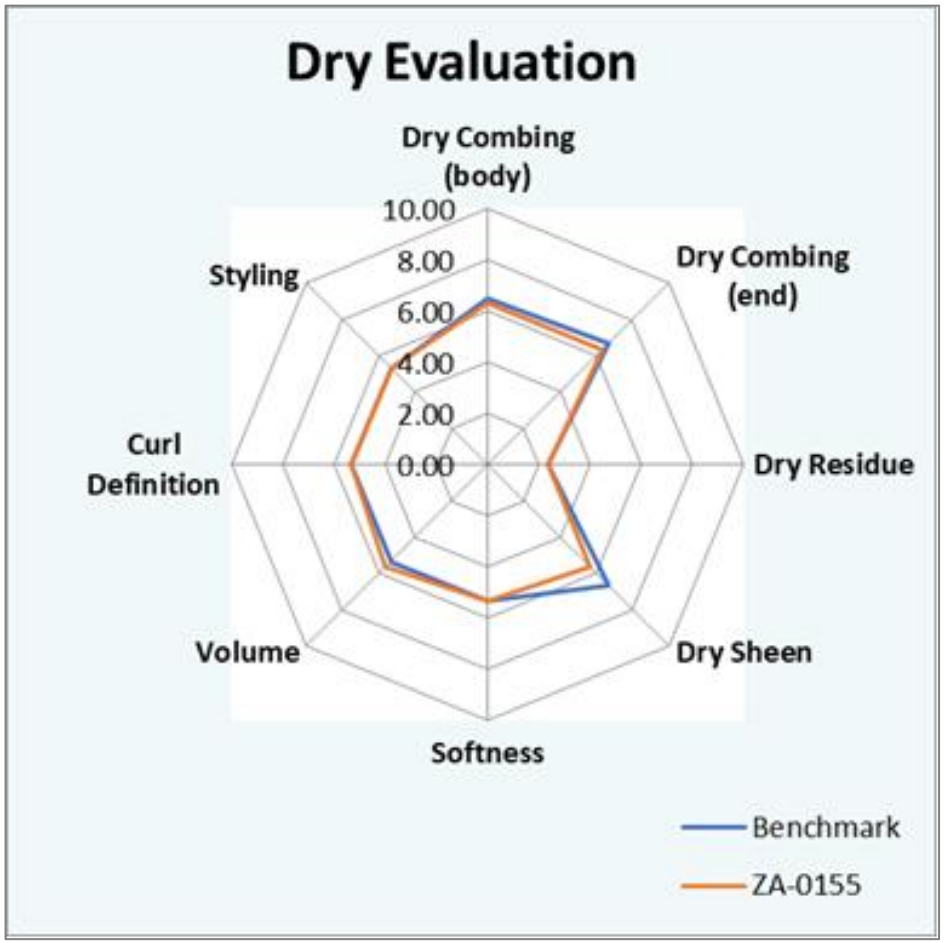
Moisturise & Style

ZA-0155

Softening Curling Custard

Ingredient/INCI Name	Functionality	% w/w
Part A		
Water Deionised (Aqua)	-	To 100
Pricerine™ 9091 (Glycerin)	Humectant	5.00
Solan™ 75 (PEG-75 Lanolin)	Emollient	2.00
Part B		
Crodazosoft™ DBQ (Quaternium-91 (and) Cetrimonium Methosulfate (and) Cetearyl Alcohol)	Conditioner	1.50
Seatons Refined Sweet Almond Oil (Prunus Amygdalus Dulcis (Sweet Almond) Oil)	Natural Emollient	3.00
Crodamol™ STS (PPG-3 Benzyl Ether Myristate)	Shine Emollient	1.00
Crodamol™ IPM (Isopropyl Myristate)	Emollient	4.00
Part C		
Viscaress™ HPD (Polyquaternium-37 (and) Hydrogenated Polydecene (and) Trideceth-6)	Rheology Modifier	3.00
Mirustyle™ CP (Aqua (and) Polyquaternium-10 (and) PG-Hydroxyethylcellulose Cocodimonium Chloride)	Curling Active	1.00
Crodarom® Manuka Honey (Water (and) Glycerin (and) Honey Extract)	Extract	1.00
Euxyl® PE 9010 (Phenoxyethanol (and) Ethylhexylglycerin)	Preservative	0.80
Sodium Hydroxide (25% solution)	pH Adjuster	qs

Salon data showed…



ZA-0155 performed on parity with the benchmark in the dry and wet attributes.

However, the panellists and stylist preferred the ZA-0155 Curling Custard formulation and felt that is gave more curls compared to the benchmark.

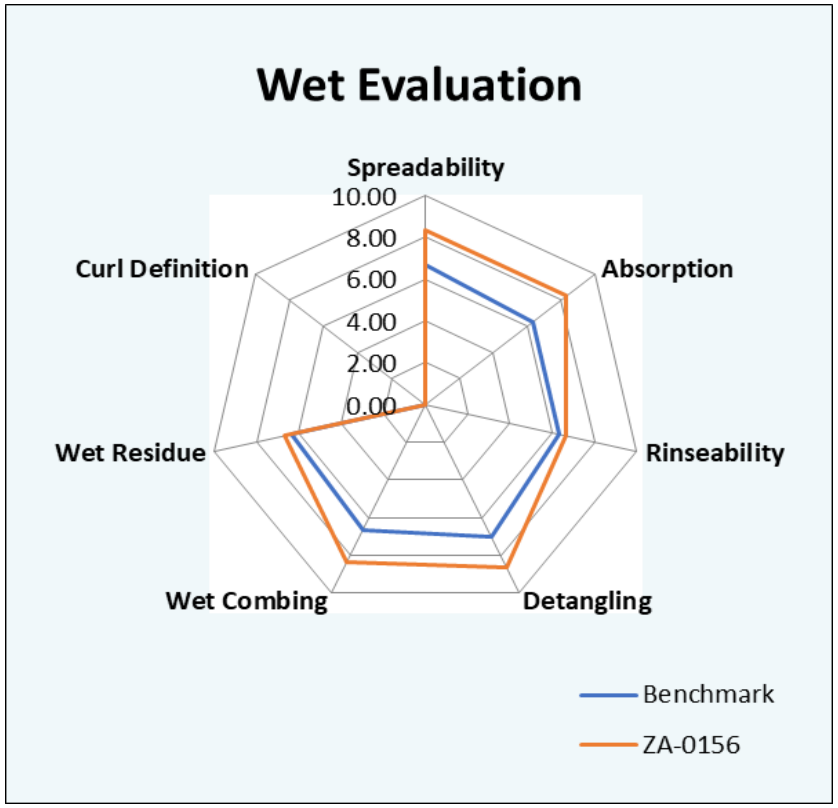
Formulations we L💙VE - for Textured Hair

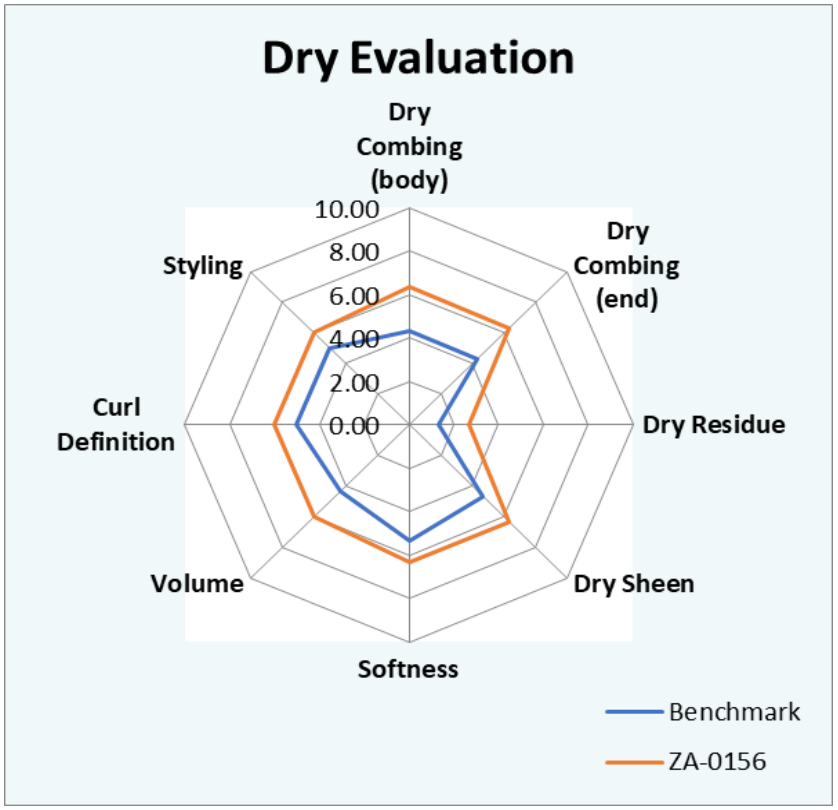
ZA-0156

Hair Treatment Mask

Ingredient/INCI Name	Functionality	% w/w
Part A		
Water Deionised (Aqua)	-	To 100
Pricerine™ 9091 (Glycerin)	Humectant	5.00
Part B		
Rejuvasoft™ (Quaternium-91 (and) Behentrimonium Chloride (and) Myristyl Myristate (and) Cetearyl Alcohol)	Conditioner	6.00
Cropure Apricot Kernel™ (Prunus Armeniaca (Apricot) Kernel Oil)	Natural Emollient	2.00
Seatons Refined Coconut Oil™ (Cocos nucifera (Coconut) Oil)	Natural Moisturiser	5.00
Seatons Cocoa Butter™ (Theobroma Cacoa (Cocoa) Seed Butter)	Natural Butter	3.00
Part C		
Keravis™ PE (Aqua (and) Hydrolyzed Vegetable Protein PG-Propyl Silanetriol)	Strengthening Active	0.80
Euxyl® PE 9010 (Phenoxyethanol (and) Ethylhexylglycerin)	Preservative	0.80

Salon data showed…





ZA-0156 Hair Treatment Mask outperformed the premium benchmark with all wet and dry attributes. The panellists and stylist felt the side treated with ZA-0156 was more conditioned, moisturised, softer and was preferred overall

Innovative Solutions for the Care of Textured Hair

Questions?

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